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SUBSTITUTION of DOMESTIC FAT for COCONUT (lauric) FAT in COATING of MILITARY CHOCOLATE CANDIES

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UNITED STATES ARMY
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Natick, Massachusetts 01760

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Domestic hard butter is a satisfactory substitute for hydrogenated coconut fat in formulating candy centers where hydrolytic rancidity can be more of a problem but not in the coating of candies where oxidative rancidity is more likely to occur.

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	ROLE	WT	ROLE	WT	ROLE	WT
Substitutes	8					
Fats	8				6	
Butter	8					
Coconut	9					
Coconut (Fat)	9				6	
Coconut (Lauric)	9				6	
Coating	4		10		6	
Candies	4		4		7	
Military	4		4			
Tests			8			
Rancidity (Hydrolytic)			9		7	
Soapiness			9			
Fats (Domestic)			10			
Storage					6	
Rancidity (Oxidative)					7	

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FOREWORD

Military candies (Type 1 chocolate coated fudges) were studied to determine whether hydrolytic rancidity problems (soapiness) encountered on long term storage of candies in the rations could be corrected by using all hydrogenated domestic fat in the center and the coating. Domestic fat was substituted for hydrogenated coconut fat in the fudge portion of the candy in early 1970. It was found however, that it was better to formulate the coating of candies with coconut fat since it had better mouth melt and was more resistant to oxidative rancidity.

This study was completed under production engineering project reference 728012.12.

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ABSTRACT

Domestic hard butter is a satisfactory substitute for hydrogenated coconut fat in formulating candy centers where hydrolytic rancidity can be more of a problem but not in the coating of candies where oxidative rancidity is more likely to occur.

RESULTS & DISCUSSION

Domestic fats in the form of hard butters are more readily available in the U. S. than coconut (lauric) fats and reportedly less prone to hydrolytic rancidity or development of "soapy" flavors (Deck, 1969; The Wecobee Handbook, 1969). Therefore, the effect of substituting them for coconut fat in the enrobing chocolate used in military ration candies was studied. Chocolate fudge, coconut cream and vanilla fudge centers were enrobed with chocolate coating containing either a domestic or a coconut fat in accordance with military specification "Candy and Chocolate Confections" MIL C 10928E. The candies were procured as part of a large purchase from a commercial candy producer. The chocolate fudge contained not less than 8% domestic hard butter while the vanilla fudge contained not less than 11% The coconut cream center candy did not have any added domestic hard butter since it contained about 8% fat from the shredded tenderized coconut. The chocolate type coating contained not less than 30% added fat as either hydrogenated coconut or domestic hard butter with a Wiley melting point of 45°C ± 1°C. and in all other respects complying with MIL-C-10928. These were then evaluated during storage intervals for acceptance by a consumer panel and by a technical panel specifically for color, odor, flavor, texture and appearance. It was found that the candies produced with 100 hour A.O.M. coconut fat in the coating were more acceptable to the consumer panel than their 100 hour A.O.M. domestic fat-containing counterparts (Table 1). A technical panel found that the main reason for these higher consumer panel hedonic ratings was apparently due to texture.

The texture of the candies containing coconut fat in the coating stored for 0, 3 and 6 months at 37.8°C. was judged significantly better than those containing domestic fats in the coating. This effect was noticeable at 0-time for the enrobed chocolate and vanilla fudges and at 3 and 6 months for all candies The lower texture rating was apparently due to a high degree of "waxiness" in the domestic hard butter coating which affected "mouth melt." Flavor differences in the candies were not apparent until the withdrawal at 3 months at 37.8°C. At that time the flavor of the candies made with 100 hour A.O.M. coconut fat in the coating was judged to be significantly better for the coconut cream and vanilla fudge candies. After 6 months at 37.8°C. the flavor of vanilla fudge was judged to be significantly better than its domestic fat coated counterpart. Several of the panelists stated that it tasted "stale" or oxidized In the vanilla fudge the odor of the coconut fat containing candy was judged to be significantly better than those containing domestic hard butter in the coating at 3 and 6 months, as well as the

color and appearance of the vanilla fudge candy at the 6 month withdrawal. All of the other treatments were judged not significantly different at any withdrawal period for any of the three (3) types of candies.

In conclusion, the domestic hard butter is a satisfactory substitute for hydrogenated coconut fat in formulating candy centers where hydrolytic rancidity can be more of a problem but not in the coating of candies where oxidative rancidity is more likely to occur.

TABLE 1

Mean Hedonic Rating (N-32)[a] of Military Chocolate-Coated Candies Containing Eithar Coconut Fat or Domestic Hard Buttar in tha Coating

Candy	Coconut Fat	Domestic Hard Butter	L.S.D.[b]
Chocolate Fudge	7.3	6.7	0.4
Coconut	7.5	6 6	0.5
Vanilla Fudge	7.1	6.2	0.5

[a]Hedonic rating ranges from "dislike extremely" (1) to "like extremely" (9); Peryam and Pilgrim 1957).

[b]Least significant difference.

TABLE 2

Sensory Technical Panel (Mean of 12 scores) for Military Ration Chocolate-Coated Candies Containing Either Coconut Fat or Domestic Hard Butter in the Coating Stored at 37.8°C for 0, 3, or 6 Mos.

		Enrobed Chocolate Fudge		Enrobed Coconut		Enrobed Vanilla Fudge	
Storage Time (months)	Attribute	Coconut	Domestic	Coconut	Domestic	Coconut	Domestic
0	Color	6.8	6.8①	7.1	6.9	6.6	6.6
	Odor	6.6	6.3	6.7	6.8	6.6	6.6
	Flavor	6.5	6.1	6.9	6.6	6.6	6.5
	Texture	6.5**	5.3	6.7	6.2	6.5**	5.0
	Appearance	6.7	6.6	7.0	7.0	6.6	6.5
3	Color	6.8	6.4	6.4	6.6	6.6	6.5
	Odor	6.8	6.3	6.2	6.0	6.8*	5.4
	Flavor	5.9	5.6	6.4**	5.1	6.3**	4.6
	Texture	6.4**	4.9	6.4*	5.6	6.4**	4.8
	Appearance	6.9	6.6	6.8	6.8	6.7	6.6
6	Color	7.1	6.5	5.7	5.8	5.6*	4.8
	Odor	6.8	6.1	5.9	5.3	5.7**	4.8
	Flavor	5.3	4.5	5.2	4.4	4.6**	3.8
	Texture	5.8*	4.6	6.0**	4.9	5.1**	3.2
	Appearance	7.0	6.6	6.0	5.8	5.9*	5.3

① A line under mean scores indicates no significant difference.

*Significant difference at 5% level.

**Significant difference at 1% level.

5 = Fair

6 = Below good above fair

7 = Good

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